

APPENDIX E  
PAVEMENT MAINTENANCE ANALYSIS

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PAVEMENT EVALUATION  
FALCON FIELD AIRPORT  
MESA, ARIZONA

JOB NO. 2121K068

PREPARED FOR:  
GILBERTSON ASSOCIATES, INC.  
23733 NORTH SCOTTSDALE ROAD, SUITE B  
SCOTTSDALE, ARIZONA 85255-3465

October 1, 1991

Gilbertson Associates, Inc.  
23733 North Scottsdale Road, Suite B  
Scottsdale, Arizona 85255-3465

Attn: Mr. David Gilbertson  
President

Re: Pavement Evaluation, Falcon Field Airport, Mesa, Arizona.  
Job No. 2121K068

### INTRODUCTION

As indicated in the scope of work of Western Technologies Inc. (WT), Proposal No. 2121A081, dated February 20, 1991, we have conducted a pavement evaluation at Falcon Field Airport, Mesa, Arizona. The purpose of this evaluation was to determine the weight of aircraft that may use various areas of this airport.

Our engineering analyses are based on the following:

- Portions of 24 sets of "as-built" drawings obtained from the City of Mesa,
- 1987 State Aviation System Plan, Pavement Maintenance Management System, Mesa Falcon Field, Mesa, Arizona, prepared by WT,
- Basis for Design Report, Falcon Field, Pavement Preservation Program, prepared by Gilbertson Associates, Inc., 1989,
- Falcon Field Paving, Phase 2, Preliminary Plans, prepared by the City of Mesa, 1991,
- Subsurface exploration performed by WT, and
- Chapters 3 and 5 of the Federal Aviation Administration Advisory Circular 150/5320-6C.

### DATA ACQUISITION

Western Technologies Inc. researched the available information that could be obtained from personnel at Falcon Field and with the City of Mesa. Portions of 24 sets of "as-built" drawings were reviewed to determine the design thicknesses and locations of various pavement sections. Available historical data are provided in Appendix A. A review of these data also provided WT with a construction history of the site.

Additional information on pavement layers and soil classifications was obtained from a pavement management study performed by WT as part of the State of Arizona Aviation System Plan for 1987. Further pavement data were also obtained from a design report prepared by Gilbertson Associates dated October 1989, and from preliminary plans prepared by the city of Mesa in 1991.

Soil classification data were obtained from a WT report dated October 14, 1974. Test results from various reports are summarized in Appendix B.

After evaluating the available data, a subsurface exploration was conducted in the T-hangar and T-shade areas, and along a taxiway located east of the this area. A total of seven soil borings were drilled through the pavement. Pavement thicknesses were measured to verify historical information and to obtain information from locations where data were either non-existent or sparse. Subgrade soils were also examined and visually classified by a geotechnical engineer. These soils were similar in classification to test results provided in other geotechnical reports for Falcon Field.

#### PAVEMENT EVALUATION

Laboratory test data performed on soil samples obtained from Falcon Field indicate that the soil is classified as an E-6. Since Falcon Field is located in an area where the average frost penetration anticipated is less than the thickness of the pavement section, the subgrade may be classified as F4. Laboratory CBR values ranging from 7 to 10 were measured for the encountered subgrade conditions. Using these data and the CBR-FAA Subgrade Class Comparisons as provided in Figure 6-16 of FAA AC150/5320-6C, a CBR value of 10 was used as a basis for this pavement evaluation.

Annual departures of 3000 were assumed as part of the data required to determine allowable aircraft weights. Pavement layer thicknesses were also compiled for the various airport areas. After reviewing the thickness data, representative thicknesses were determined for the major airport elements.

The pavement evaluation was performed by use of Chapter 5, of the FAA Advisory Circular 150/5320-6C. In order to use the advisory circular procedures, it was necessary to convert the actual pavement layer thicknesses to equivalent pavement layers. Conversion factors were used for this purpose. Asphalt concrete layer thickness was converted to equivalent aggregate base by multiplying by a factor of 1.7. Cement treated base layer thickness was converted to equivalent aggregate base by multiplying by a factor of 1.6. Aggregate base layer thickness was converted to equivalent subbase by multiplying by a factor of 1.7.

## EVALUATION RESULTS

Falcon Field was established and much of its pavement constructed prior to the publication of FAA AC150/5320-6C and the design procedures provided in that document. However, more recent pavement designs for either new construction or rehabilitation of existing pavements have been performed by use of the pavement design methods provided in the current advisory circular. Consequently, it is recommended that the pavement evaluation for the entire facility be based upon the pavement design curves provided in FAA AC150/5320-6C. A CBR of 10 is representative of the soil conditions over the facility. For design curves other than lightweight aircraft, a value for annual departures of 3,000 is recommended for evaluation purposes.

The results of these evaluations are provided below and are also shown on a colored map (Figure 1).

### Main Runway (4R/22L) and Parallel Taxiway : (Green)

Pavement Section: 3-1/2" AC + 8" AB  
Equivalent Pavement Section: 4" AC\* + 6" AB + 2" SB = 12"  
Single Wheel Gear: 38,000 lb  
Dual Wheel Gear: 50,000 lb  
Dual Tandem Gear: 90,000 lb

\*Design curves require 4" AC for critical areas

### Secondary Runway (4L/22R) and Parallel Taxiway : (Orange)

Pavement Section: 2" AC + 5" AB  
Equivalent Pavement Section: 2" AC + 5" AB = 7"  
Single Wheel, Lightweight Aircraft: 12,000 lb

### T-Hangars, T-Shades, and Runway 4L/22R Apron Area : (Red)

Pavement Section: 2" AC + 4" AB  
Equivalent Pavement Section: 2" AC + 4" AB = 6"  
Single Wheel, Lightweight Aircraft: 4,000 lb

### Main Apron, Terminal Apron Area, Taxiway East of T-Hangars, and West Taxiway : (Blue)

Pavement Section: 2" AC + 6" CTB or equivalent for proposed construction  
Equivalent Pavement Section: 2" AC + 6" AB + 7" SB = 15"  
Single Wheel, Lightweight Aircraft: 30,000 lb

Gilbertson Associates, Inc.  
Job No. 2121K068

### CLOSURE

This report concludes the pavement evaluation of the Falcon Field Airport at this time. We are available to discuss this report with you or to perform additional work.

Sincerely,  
WESTERN TECHNOLOGIES INC.  
Materials Engineering Services

W.R. Meier, Jr., Ph.D., P.E.  
Senior Materials Engineer

Reviewed by: Edward Elnicky, P.E.  
Materials Engineer

sfp/pavement/gilbert3.068

Enclosure:     Pavement Evaluation Map  
                 Appendix A, Historical Data  
                 Appendix B, Laboratory Data

Copies to:     Addressee (5)

APPENDIX A  
HISTORICAL DATA

The material provided in this Appendix was obtained from a research review conducted at the Engineering Offices at the City of Mesa. Historical dates given below were obtained from "as-built" drawings. These dates may differ from previous reports produced. Part of this discrepancy may be due to the use of the design project date in lieu of the "as-built" date.

Section numbers as given below correspond to areas as outlined in a map of Falcon Field produced by Gilbertson Associates dated June 1989.

Date	Section	Construction
1962	Runway 4R/22L (7)	Seal Coat, 2" AC, 8" AB, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Apron (70)	Seal Coat, 2" AC, 8" AB, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Cross Taxiway (55)	Seal Coat, 2" AC, 8" AB, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Cross Taxiway C-3 (61) and 250' of Taxiway (10)	Seal Coat, 2" AC, 8" AB, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Taxiways D-1 (9B) and D-2 (10)	Seal Coat, 2" AC, 8" AB, 6" Compacted Native soil, 95% AASHTO-T-180, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Apron (54)	Seal Coat, 2" AC, 8" AB, 6" Compacted Native Soil, 95% AASHTO-T-180, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Cross Taxiway B-5 (58)	Seal Coat, 2" AC, 8" AB, 6" Compacted Native soil, 95% AASHTO-T-180, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	Apron (73)	Initial Construction before 1962, 2" AC Overlay 1962
1962	Apron (72B)	Seal Coat, 2" AC, 8" AB, 6" Compacted Native Soil, 95% AASHTO-T-180, 12" Compacted Native Soil, 90% AASHTO-T-180
1962	North End of Taxiway B-6 (46)	Seal Coat, 2" AC, 8" AB, 6" Compacted Native Soil, 95% AASHTO-T-180, 12" Compacted Native Soil, 90% AASHTO-T-180

Date	Section	Construction
1962-1969	T-Hangar No. 1 (74-76)	2" AC, 4" AB
1969	T-Hangar B (74-76)	2" AC, 4" AB
1970	Apron (49 & 50)	2" AC, 6" AB
1970	Auto Parking, Driveways (52)	2" AC, 4" AB
1970	Apron (70)	2" AC, 4" AB
1973	T-Hangars D, E, F & H (36-45 & 48)	2" AC, 4" AB
1974	T-Hangar O (31)	2" AC, 4" AB
1974	T-Hangar C (36-45 & 48)	2" AC, 4" AB, 6" Compacted Subbase
1975	T-Hangar I (36-45 & 48)	2" AC, 4" AB, 6" Compacted Subbase
1969-1975	T-Hangar A (74-76)	2" AC, 4" AB
1969-1975	Two Covered Tiedowns (73)	2" AC, 5" AB
1975	All Taxiways	Slurry Seal
1975	Runway, Aprons (72B & 73)	Fog Seal
1976	T-Hangars L & No. 37 (31-35)	Fog Seal, 2" AC (D-1/2), 4" AB
1975	T-Hangars J & K (36-45 & 48)	2" AC, 4" AB
1976	T-Hangars M & N (36-45 & 48), (31-35)	2" AC, 4" AB
1977	T-Hangar L (31-35)	1" AC Overlay (for drainage)
1977	Taxiway to Cactus Aviation (80)	2" AC, 8" AB, Compacted Native Soil, 95% AASHTO-T-99
1977	Apron Extension (73)	2" AC, 8" AB, Compacted Native Soil, 95% AASHTO-T-99
1977	Taxiway D (56)	2" AC, 8" AB, Compacted Native Soil, 95% AASHTO-T-99
1977	Taxiway E (60)	2" AC, 8" AB, Compacted Native Soil, 95% AASHTO-T-99
1977	Apron Extension (47)	2" AC, 8" AB, Compacted Native Soil, 95% AASHTO-T-99



Date	Section	Construction
1977	Taxiway F (29)	2" AC, 4" AB, 6" Compacted Fill
1977	Taxiway G (27)	2" AC, 4" AB, 6" Compacted Fill
1979	Apron (72A)	2" AC, 8" AB, 9" Compacted Native Soil, 95% AASHTO-T-180
1979	Apron (47)	2" AC, 8" AB, 9" Compacted Native Soil, 95% AASHTO-T-180
1979	Apron (49 & 50)	2" AC, 4" AB
1980	Taxiway East of (29)	2" AC (C-3/4), 4" AB
1981	Runway 4R Extension (6) & (53)	4" AC, 6" AB
1981	Runway 4R/22L 220' West Extension (6)	3" AC Overlay Tapered to Existing 2" AC
1981	Taxiway A-3 (71)	3" AC Overlay Tapered to Existing 2" AC
1981	Taxiway B-5 (58) 25' Widening	3" AC, 8" AB
1981	Runway 4R/22L 600' East Extension (8), Taxiways C-4 (62), D-3 (78)	4" AC, 6" AB
1981	Taxiway A-2 (5)	2" AC, 5" AB
1981	Taxiway B-4 (4)	2" AC, 5" AB
1981	Taxiway C-2 (3)	2" AC, 5" AB
1981	Runway 4L/22R (2)	Seal Coat, 2" AC, 5" AB
1981	Taxiway E-1 & E-2 (1)	Seal Coat, 2" AC, 5" AB
1981	Cross Taxiways A-1 (64), B-3 (65) & C-1 (63)	Seal Coat, 2" AC, 5" AB
1981	Taxiway B-2 (65)	Seal Coat, 2" AC, 5" AB
1982	Confederate Air Force Taxiway	3" AC (C-3/4), 6" AB
1982	All Aprons, Runways, Taxiways, and T-Hangars	Seal Coat
1983	Taxiway B-1 (66)	4" AC, 8" AB

Date	Section	Construction
1983	West Taxiway (67 & 68)	3" AC, 6" AB
1984	All T-Hangars and T-Shades Constructed	
1985	Taxiway East of (29)	2" AC (C-3/4), 4" AB
1987	Apron Area (29)	2" AC (C-3/4), 4" AB, 7" Select Material
1989	Runway 4R/22L, Parallel Taxiway, Cross Taxiways (53), (71), (55), (56), (58), (59), (60), (61), & (62)	1-1/2" AC Overlay
1989	T-Hangars (81)	2" AC (C-3/4), 4" AB
1989	Taxiway (81)	2" AC (C-3/4), 6" AB
1990	Apron (72B & 73)	2" AC, 6" CTB, 6" Compacted Subgrade, 95% ASTM D-698
1991	(Proposed) Apron Areas (72A, 9A, 70, 49, 50, 47, & 46)	2" AC, 6" CTB or 2" AC, 2" ATB
1991	(Proposed) Runway 4L/22R, 4R/22L, All Taxiways and T-Hangars	Crack Seal, Seal Coat, or Slurry Seal
<p style="text-align: center;">NOTES</p> <p>AC = Asphalt Concrete                      A-1 = City of Mesa Designation  AB = Aggregate Base                      (64) = WT Section No.  CTB = Cement Treated Base</p>		

APPENDIX B

TEST RESULT SUMMARY							
Particle Size Distribution (%) Passing by Weight					LL	PL	FAA Classification
3"	#4	#10	#40	#200			
100	90	81	67	51	26	10	E-6
100	93	85	69	49	34	18	E-7
100	94	85	69	49	33	17	E-7
100	98	91	74	45	21	5	E-6
100	97	91	76	51	26	10	E-6
100	98	91	74	48	--	NP	E-6
--	--	83	69	61	28	13	E-7
--	--	88	70	56	23	10	E-7
--	--	82	58	48	23	7	E-6
--	--	73	44	42	24	7	E-6
--	--	90	72	57	27	12	E-7
--	--	81	65	57	26	10	E-7
--	--	84	60	58	27	12	E-7
NOTES:      LL = Liquid Limit PI = Plasticity Index NP = Nonplastic							



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August 27, 1992

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Attn: Mr. David Gilbertson, P.E.  
President

Re: Parking Apron Rehabilitation, Falcon Field Airport, Mesa, Arizona.  
Job No. 2129J193

The April 25, 1990, addendum to our report for Falcon Field Airport included a pavement reconstruction alternate of cold recycling the existing asphalt concrete surface layer. Following the recycling of 2 or 2.5 inches of the existing pavement surface layer, the design provided for overlaying with 2 inches of new asphalt concrete.

It is our understanding that during reconstruction of a portion of the main parking apron at Falcon Field the pavement surface layer was removed and 4 inches of new asphalt concrete was placed. The additional 2 inches of asphalt concrete would be equal to or exceed the structural capacity of the 2 to 2.5 inches of cold recycled asphalt concrete. Consequently, the design change will result in a pavement structure that would equal or exceed the pavement design alternate presented in our amended report.

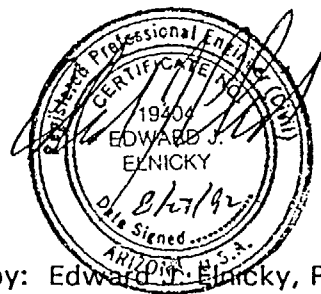
Sincerely,

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sfp/reports/falcon.wrm

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